Assessing the risk of Kerb® SC herbicide carryover to winter wheat following use in spring canola

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The acrage of spring canola has been increasing in the high rainfall zone of eastern WA. Italian ryegrass is one of the most troublesome weeds in this production zone. Italian ryegrass is resistant to most Group 1 and 2 postemergence herbicides. Kerb SC (pronamide) is a Group 3 herbicide which also includes Prowl 3.3 EC/Prowl H_2O (prodiamine) and Sonalan HFP (ethalfluralin). These herbicides are primarily root absorbed and act on the growing point of the plant, inhibiting root and shoot growth. The objective of this study was to determine if late-fall and late-winter applications of Kerb SC will control Italian ryegrass in the spring canola crop, and whether or not the product will carry over and injure the following winter wheat crop.

Late-fall and late-winter applications of Kerb SC (1.25 & 2.5 pt/a) were applied on 11/21/2020 and 3/9/2021, respectively. All Kerb SC treatments were applied at 15 GPA. The trial area was planted to 'CP9978TF' spring canola on April 23, 2021 with a Horsch direct seed planter. Precipitation that fell between the time the late-fall and late-winter applications were made, and planting was 9.1 and 0.92 inches, respectively.

This trial was placed on a gentle slope in a field at the Cook Agronomy Farm, near Pullman. This was done to minimize the risk of a heavy infestation of Italian ryegrass since the main objective of this study is to evaluate the potential for crop injury in the following winter wheat crop. On May 26th, 34 days after planting, canola and Italian ryegrass plants were counted within two quarter meter square-frames. None of the Kerb SC applications affected canola stand density, which averaged 3.9 plants/ft^2, or yield, which averaged 170 lb/a. All Kerb SC treatments reduced the number of Italian ryegrass plants per square foot when compared to the nontreated check plots (Table 1). There were no significant differences among the four Kerb SC treatments in relation to the number of Italian ryegrass plants per square foot. Visual Italian ryegrass control ratings suggested greater treatment differences. Kerb SC at 2.5 pt/a applied on 11/21/20 provided the best control of Italian ryegrass followed by Kerb SC at 1.25 pt/a applied on 11/21/20. The late-winter applications of Kerb SC did not provide commercially acceptable control of Italian ryegrass. From the time the late-winter applications were made, to when the visual control ratings were taken, only 1.19 inches of rain fell. Rain events were spaced far apart, and they were not heavy rain events. This may have impeded the activation of Kerb SC.

Table 1. The effect of Kerb SC on Italian ryegrass control.

			5/26/21	6/8/21
			Italian ryegrass	
Treatment	Rate	Application date	plants	control
	pt/a		ft^2	%
Nontreated control	--	--	2.4 a[1]	--
Kerb SC	1.25	11/21/20	0.5 b	77 b
Kerb SC	2.5	11/21/20	0.0 b	95 a
Kerb SC	1.25	3/9/21	0.4 b	38 d
Kerb SC	2.5	3/9/21	0.5 b	60 c

[1] Means, based on six replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test, which means that we are not confident that the difference is the result of treatment rather than experimental error or random variation associated with the experiment.

Following such a dry year, our farm manager was waiting for a significant rain event before planting winter wheat. This event came September 27/28, 2021, and provided of 0.47 inches of rain. He waited until October 4th to direct seed 'PNW Trident' winter wheat. By that time, the majority of the soil moisture was lost. The wheat was planted into dry soil. The ground was very hard even following this rain event. Wheat seed was placed shallow, 0.5-inch depth, and not firmly against the furrow. Significant rainfall did not return until October 25th and was then followed by cold nighttime temperatures between November 7 and 14. By November 15th, crop injury was first noticeable as the wheat in the nontreated check plots was much more vigorous than the wheat in all of the Kerb SC-treated plots. A clearer picture of the scope of the crop injury was evident in the late spring (Figure 1).

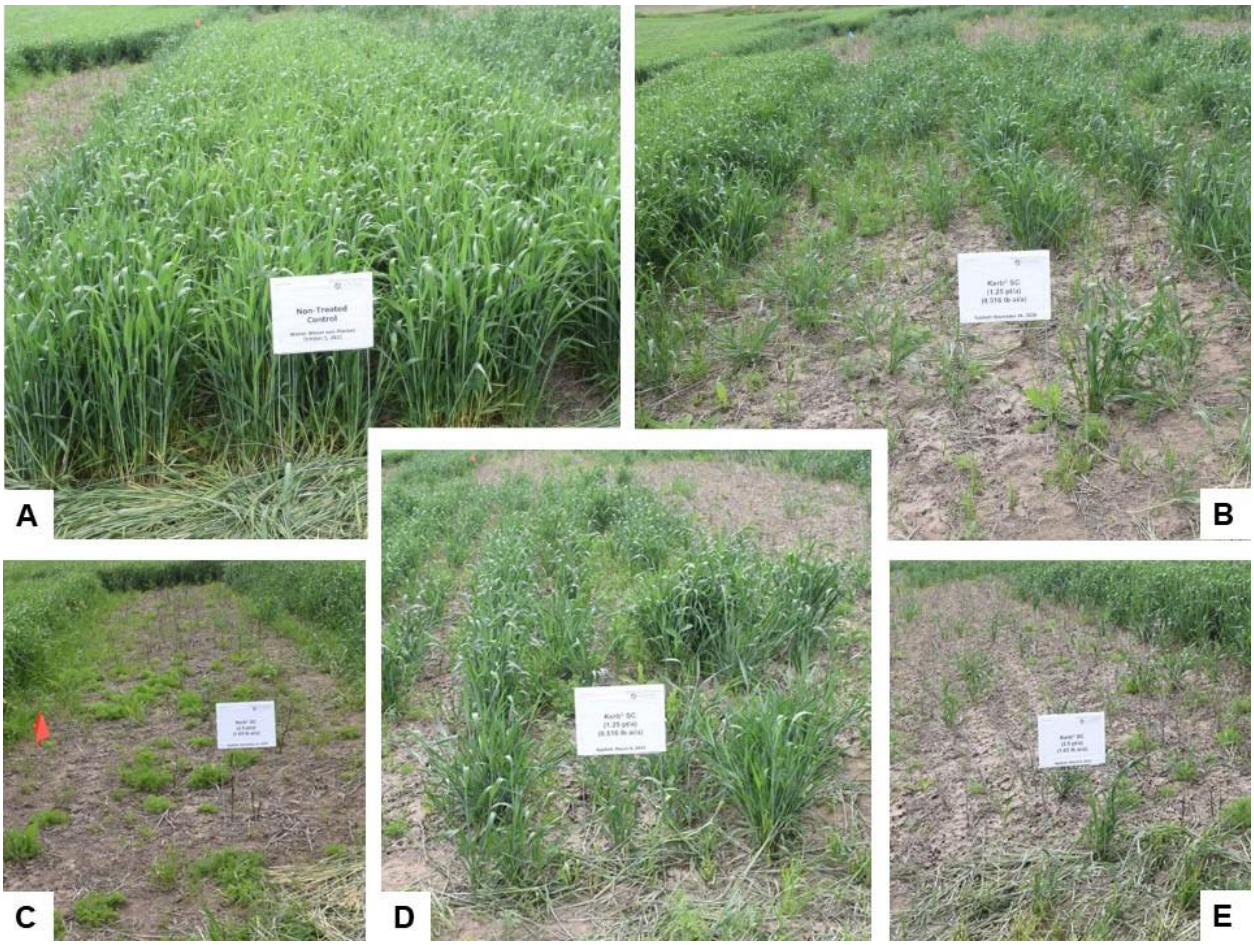

Figure 1. (A) Nontreated check. (B) Kerb SC 1.25 pt/a applied 11/21/2020. (C) Kerb SC 2.5 pt/a applied 11/21/2020. (D) Kerb SC 1.25 pt/a applied 3/9/2021. (E) Kerb SC 2.5 pt/a applied 3/9/2021. Photos were taken on 6/9/2022.

Winter wheat was harvested on August 8, 2022. Winter wheat grain yields were strongly and negatively affected by Kerb SC residues in the soil (Table 2). Very few wheat plants emerged in plots treated with the 2.5 pt/a rate of Kerb SC. These plots were not harvested. Plots treated with 1.25 pt/a of Kerb SC yielded about one-fourth of what the nontreated check treatment yielded. It did not matter if the Kerb SC was applied in late-fall or late-winter.

Table 2. Winter wheat yield following late-fall and late-winter applications of Kerb SC prior to spring canola planting in the spring of 2021.

			8/16/2022
Herbicide treatment	Rate	Application date	Grain yield
	pt/a		bu/a
Nontreated check	---	---	121 a[1]
Kerb SC	1.25	11/21/2020	32 b
Kerb SC	1.25	3/9/2021	36 b

[1] Means, based on six replicates, within a column, followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test, which means that we are not confident that the difference is the result of treatment rather than experimental error or random variation associated with the experiment.

The 2021 growing season was plagued by drought. This likely resulted in limited herbicide degradation and a worst-case scenario for herbicide carryover. The continued dry conditions at winter wheat seeding resulted in a shallow seeding depth, which may have placed the winter wheat seed in or above the layer of soil containing the herbicide residues. If true, this would have resulted in significantly more crop injury than if the seed had been placed below the soil containing herbicide residues. This series of studies were repeated, initiated in the fall of 2021, to determine if Kerb SC will carry over into the winter wheat planting following a spring canola planting, based on the prevailing environmental conditions.

Disclaimer

Some of the pesticides discussed in this presentation were tested under an experimental use permit granted by WSDA. Application of a pesticide to a crop or site that is not on the label is a violation of pesticide law and may subject the applicator to civil penalties up to $7,500. In addition, such an application may also result in illegal residues that could subject the crop to seizure or embargo action by WSDA and/or the U.S. Food and Drug Administration. It is your responsibility to check the label before using the product to ensure lawful use and obtain all necessary permits in advance.